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Transmittal Note

SUPPLEMENT TO
ANNEX 14, VOLUME I —
AERODROME DESIGN AND OPERATIONS
(Third Edition)

1. The attached Supplement supersedes all previous Supplements to Annex 14, Volume I, and includes differences notified by Contracting States up to 11 August 2000.
2. This Supplement should be inserted at the end of Annex 14, Volume I, Third Edition. Additional differences and revised comments received from Contracting States will be issued at intervals as amendments to this Supplement.

SUPPLEMENT TO ANNEX 14, VOLUME I — THIRD EDITION

AERODROME DESIGN AND OPERATIONS

Differences between the national regulations and practices of States and the corresponding International Standards contained in Annex 14, Volume I, as notified to ICAO in accordance with Article 38 of the *Convention on International Civil Aviation* and the Council's resolution of 21 November 1950.

SEPTEMBER 2000

INTERNATIONAL CIVIL AVIATION ORGANIZATION

RECORD OF AMENDMENTS TO SUPPLEMENT

<i>No.</i>	<i>Date</i>	<i>Entered by</i>	<i>No.</i>	<i>Date</i>	<i>Entered by</i>

RECORD OF AMENDMENTS TO ANNEX 14, VOLUME I (THIRD EDITION)

<i>No.</i>	<i>Date of adoption or approval</i>	<i>Date applicable</i>	<i>No.</i>	<i>Date of adoption or approval</i>	<i>Date applicable</i>

1. Contracting States which have notified ICAO of differences

The Contracting States listed below have notified ICAO of differences which exist between their national regulations and practices and the International Standards and Recommended Practices of Annex 14, Volume I, Third Edition, or have commented on implementation.

The page numbers shown for each State and the dates of publication of those pages correspond to the actual pages in this Supplement.

<i>State</i>	<i>Pages in Supplement</i>	<i>Date of publication</i>
Austria	1	8/9/00
Belgium	1-2	8/9/00
Canada	1-2	8/9/00
China (Hong Kong SAR)	1-2	8/9/00
Denmark	1	8/9/00
Finland	1-3	8/9/00
France	1-6	8/9/00
Germany	1	8/9/00
Japan	1	8/9/00
Kyrgyzstan	1	8/9/00
Netherlands	1	8/9/00
New Zealand	1-2	8/9/00
Norway	1	8/9/00
Portugal	1	8/9/00
Russian Federation	1-2	8/9/00
South Africa	1	8/9/00
Spain	1	8/9/00
Sweden	1	8/9/00
Switzerland	1	8/9/00
Uganda	1	8/9/00
United Kingdom	1-6	8/9/00
United States	1-13	8/9/00

2. Contracting States which have notified ICAO that no differences exist

Colombia	Ireland	Peru
Egypt	Malaysia	Sri Lanka
Georgia	Monaco	United Republic of Tanzania
Ghana	Namibia	

3. Contracting States from which no information has been received

Afghanistan	Ethiopia	Nigeria
Albania	Fiji	Oman
Algeria	Gabon	Pakistan
Angola	Gambia	Palau
Antigua and Barbuda	Greece	Panama
Argentina	Grenada	Papua New Guinea
Armenia	Guatemala	Paraguay
Australia	Guinea	Philippines
Azerbaijan	Guinea-Bissau	Poland
Bahamas	Guyana	Qatar
Bahrain	Haiti	Republic of Korea
Bangladesh	Honduras	Republic of Moldova
Barbados	Hungary	Romania
Belarus	Iceland	Rwanda
Belize	India	Saint Lucia
Benin	Indonesia	Saint Vincent and the Grenadines
Bhutan	Iran (Islamic Republic of)	Samoa
Bolivia	Iraq	San Marino
Bosnia and Herzegovina	Israel	Sao Tome and Principe
Botswana	Italy	Saudi Arabia
Brazil	Jamaica	Senegal
Brunei Darussalam	Jordan	Seychelles
Bulgaria	Kazakhstan	Sierra Leone
Burkina Faso	Kenya	Singapore
Burundi	Kiribati	Slovakia
Cambodia	Kuwait	Slovenia
Cameroon	Lao People's Democratic Republic	Solomon Islands
Cape Verde	Latvia	Somalia
Central African Republic	Lebanon	Sudan
Chad	Lesotho	Suriname
Chile	Liberia	Swaziland
China	Libyan Arab Jamahiriya	Syrian Arab Republic
Comoros	Lithuania	Tajikistan
Congo	Luxembourg	Thailand
Cook Islands	Madagascar	The former Yugoslav Republic of Macedonia
Costa Rica	Malawi	Togo
Côte d'Ivoire	Maldives	Tonga
Croatia	Mali	Trinidad and Tobago
Cuba	Malta	Tunisia
Cyprus	Marshall Islands	Turkey
Czech Republic	Mauritania	Turkmenistan
Democratic People's Republic of Korea	Mauritius	Ukraine
Democratic Republic of the Congo	Mexico	United Arab Emirates
Djibouti	Micronesia (Federated States of)	Uruguay
Dominican Republic	Mongolia	Uzbekistan
Ecuador	Morocco	Vanuatu
El Salvador	Mozambique	Venezuela
Equatorial Guinea	Myanmar	Viet Nam
Eritrea	Nauru	Yemen
Estonia	Nepal	Zambia
	Nicaragua	Zimbabwe
	Niger	

4. Paragraphs with respect to which differences have been notified

<i>Paragraph</i>	<i>Differences notified by</i>	<i>Paragraph</i>	<i>Differences notified by</i>
Table 1-1	New Zealand	3.1.15	France
1.1	Austria	3.1.16	Russian Federation
	China (Hong Kong SAR)		United States
	France	3.1.18	United States
	South Africa	3.2.3	Belgium
	United Kingdom		Russian Federation
	United States		United States
1.2.1	United States	3.2.4	United States
1.3	Belgium	3.3.2	Kyrgyzstan
	France		New Zealand
	Russian Federation		Spain
1.3.1	United States	3.3.3	United States
1.3.2	United States	3.3.4	United States
1.3.3	United States	3.3.5	United States
1.3.4	United States	3.3.7	Belgium
			New Zealand
2.1.3	Netherlands		Russian Federation
2.1.5	Germany		United States
2.1.6	Germany	3.3.9	United States
2.1.7	Netherlands	3.3.12	United Kingdom
2.2.1	United States	3.3.14	United States
2.3.1	Netherlands	3.3.15	United States
2.3.2	Netherlands	3.3.17	United States
2.3.3	Netherlands	3.4	France
2.5.3	Netherlands		Russian Federation
2.5.4	Netherlands	3.4.1	Canada
2.6	Canada		Denmark
	Uganda		New Zealand
2.6.2	Netherlands		Norway
2.6.5	Netherlands		Portugal
2.6.6	Netherlands	3.4.2	Austria
2.6.8	Netherlands		Japan
2.7	Canada		New Zealand
2.9.6	Norway		Portugal
	United States		United States
2.9.7	United States	3.4.3	New Zealand
2.9.9	Spain		Portugal
2.11.3	United States		Spain
2.11.4	France		United Kingdom
2.12	United States	3.4.4	Finland
		3.4.9	United Kingdom
Table 3-1	United Kingdom	3.5.4	United Kingdom
Table 3-2	United Kingdom	3.6.4	Russian Federation
	United States		United States
3.1.2	Russian Federation	3.7	Russian Federation
	United States		Spain
3.1.9	Belgium	3.7.1	France
	United States		United States
3.1.11	Spain	3.7.2	United States
3.1.12	Canada	3.7.3	France
	United States	3.7.4	France
3.1.13	United Kingdom	3.8.3	Belgium
3.1.14	United Kingdom		United States

<i>Paragraph</i>	<i>Differences notified by</i>	<i>Paragraph</i>	<i>Differences notified by</i>
3.8.4	Belgium	5.1.1.4	Canada
	Russian Federation	5.1.2	Canada
	United States	5.1.4	Canada
3.8.5	United States	5.2.1.4	Norway
3.8.7	Belgium	5.2.1.5	Austria
	Russian Federation		France
	United Kingdom	5.2.1.8	United States
	United States	5.2.2.2	United States
3.8.8	United States	5.2.2.4	Canada
3.8.10	United States		United States
3.8.11	United States	5.2.3.3	France
3.8.20	Russian Federation	5.2.3.4	France
3.8.21	China (Hong Kong SAR)	5.2.4.2	United States
3.9	Belgium	5.2.4.3	United Kingdom
3.9.1	Russian Federation		United States
	United States	5.2.4.5	France
3.10	Russian Federation		United States
3.10.5	United States	5.2.4.6	United States
3.11	France	5.2.4.10	United States
3.11.4	Russian Federation	5.2.5	Russian Federation
3.11.5	France		Sweden
3.11.6	Belgium	5.2.5.2	France
	France		United States
	United States	5.2.5.3	United States
3.11.7	France	5.2.5.4	United States
3.14	New Zealand	5.2.5.5	France
	Russian Federation		United Kingdom
3.14.4	United States	5.2.6	Sweden
3.14.9	United States	5.2.6.3	United States
3.14.10	United States	5.2.6.4	United States
		5.2.6.5	United States
Table 4-1	Canada	5.2.7.1	Russian Federation
	New Zealand	5.2.7.2	Canada
	United Kingdom		France
	United States	5.2.7.4	United States
4.1	United States	5.2.8.1	United Kingdom
4.1.1	Canada	5.2.8.2	Canada
4.1.9	France	5.2.8.3	United States
4.1.13	France	5.2.8.7	Canada
4.1.14	France	5.2.9	Canada
4.1.15	France		South Africa
4.1.16	France	5.2.9.3	Russian Federation
4.1.21	United States	5.2.9.6	United States
4.1.22	Canada	5.2.9.7	Russian Federation
4.1.25	Austria		United States
	United States	5.2.10	Canada
4.1.27	France		China (Hong Kong SAR)
4.2	Austria		Russian Federation
	Russian Federation	5.2.10.1	France
	United States	5.2.11	Canada
4.2.1	France		Russian Federation
4.2.9	France	5.2.11.4	United States
4.2.17	France	5.2.11.5	United States
		5.2.11.6	United States
Chapter 5	New Zealand	5.2.12	United States
Figure 5-12	Canada	5.2.13.1	United States

<i>Paragraph</i>	<i>Differences notified by</i>	<i>Paragraph</i>	<i>Differences notified by</i>
5.2.14	Russian Federation	5.3.5.27	United States
5.2.14.1	United States	5.3.5.42	Japan
5.2.15	Spain		United Kingdom
	United Kingdom		United States
5.2.16.1	Sweden	5.3.6	Canada
5.3.1.1	United States	5.3.7	Canada
5.3.1.2	United States	5.3.8	Canada
5.3.1.3	United States	5.3.8.4	United States
5.3.1.4	United States	5.3.9.7	Canada
5.3.2.1	United States	5.3.10.1	Norway
5.3.2.2	United States	5.3.10.3	Canada
5.3.2.3	United States	5.3.12.2	United Kingdom
5.3.3	Canada	5.3.12.3	France
5.3.3.1	United States	5.3.12.4	United Kingdom
5.3.3.3	Finland	5.3.13.2	United States
	United States	5.3.14	Japan
5.3.3.6	United States		United States
5.3.3.8	United States	5.3.14.3	Canada
5.3.3.12	France	5.3.15.1	France
5.3.4.1	Finland		United Kingdom
	France		United States
	United States	5.3.15.2	France
5.3.4.2	Canada		United States
	United States	5.3.15.3	France
5.3.4.10	Belgium	5.3.15.4	United States
	United States	5.3.15.7	United Kingdom
5.3.4.11	United States		United States
5.3.4.12	United States	5.3.15.10	United States
5.3.4.13	United States	5.3.15.11	United Kingdom
5.3.4.14	United States	5.3.15.13	United Kingdom
5.3.4.15	Canada	5.3.15.17	United Kingdom
	United Kingdom	5.3.15.18	United Kingdom
	United States	5.3.16.2	France
5.3.4.16	United States		United States
5.3.4.17	United States	5.3.16.6	United Kingdom
5.3.4.18	United States	5.3.17.1	France
5.3.4.19	United States		United States
5.3.4.22	Belgium	5.3.17.2	France
	United Kingdom		United States
	United States	5.3.17.3	France
5.3.4.23	Belgium		United States
5.3.4.24	Belgium	5.3.17.4	United States
	United Kingdom	5.3.17.5	United States
5.3.4.30	United Kingdom	5.3.17.6	United States
5.3.4.32	United Kingdom	5.3.17.9	United States
5.3.4.33	United Kingdom	5.3.17.10	Austria
5.3.4.35	United States		Spain
5.3.5	Spain		United States
	Switzerland	5.3.17.14	Belgium
5.3.5.1	Canada		France
	Finland	5.3.18	France
	France	5.3.18.1	Finland
	United States		United States
5.3.5.2	United States	5.3.18.2	United States
5.3.5.3	United States	5.3.19	United Kingdom
5.3.5.4	United States	5.3.20.1	Finland

<i>Paragraph</i>	<i>Differences notified by</i>	<i>Paragraph</i>	<i>Differences notified by</i>
	France	5.4.3.30	China (Hong Kong SAR)
	United States		France
5.3.20.2	United States		United Kingdom
5.3.20.4	United States	5.4.3.34	United States
5.3.20.5	United States	5.4.4.4	United States
5.3.20.17	United States	5.4.5	Canada
5.3.21	United States	5.4.5.1	United States
5.3.22	Spain	5.4.6.1	United States
	United States	5.4.7.2	United States
5.3.22.11	United Kingdom	5.5.2.2	United States
5.3.22.14	United Kingdom	5.5.3	United States
5.3.22.16	United Kingdom	5.5.3.1	Canada
5.3.24	Austria		United Kingdom
5.3.24.1	United States	5.5.3.2	United Kingdom
5.4	Belgium	5.5.7.1	United States
	Spain		
5.4.1.3	United States	Chapter 6	Sweden
5.4.1.6	France	Table 6-2	New Zealand
	United States	Table 6-3	Finland
5.4.1.7	Finland		New Zealand
	United States		United States
5.4.1.8	Finland	6.1	United States
5.4.1.9	United Kingdom	6.1.3	Finland
5.4.2	France	6.1.5	Norway
5.4.2.2	United States	6.2.3	United States
5.4.2.4	United States	6.2.4	Russian Federation
5.4.2.5	France	6.2.6	Canada
5.4.2.7	United States	6.2.8	United Kingdom
5.4.2.8	France	6.2.9	Switzerland
	United Kingdom	6.2.12	Austria
5.4.2.9	Canada	6.3.3	Switzerland
	United States	6.3.4	Belgium
5.4.2.10	France	6.3.5	Belgium
	United States	6.3.9	Norway
5.4.2.11	United States	6.3.16	Spain
5.4.2.14	France		United Kingdom
	United States	6.3.17	United Kingdom
5.4.2.15	United States	6.3.18	United Kingdom
5.4.2.18	United States	6.3.21	United States
5.4.3.3	France	6.3.22	United States
5.4.3.5	France	6.3.25	Japan
	United Kingdom	6.3.26	Finland
5.4.3.6	Austria		
5.4.3.7	France	7.1	Russian Federation
5.4.3.10	France	7.1.2	United States
5.4.3.14	United Kingdom	7.1.4	Finland
5.4.3.15	United States		United Kingdom
5.4.3.17	United Kingdom		United States
	United States	7.1.5	United States
5.4.3.21	France	7.1.7	United States
	United Kingdom	7.2.2	Canada
5.4.3.25	United Kingdom		United Kingdom
5.4.3.26	United Kingdom	7.3	Russian Federation
5.4.3.27	United Kingdom	7.3.1	France
	United States	7.4.4	United States
5.4.3.29	United States		

<i>Paragraph</i>	<i>Differences notified by</i>	<i>Paragraph</i>	<i>Differences notified by</i>
Chapter 8	New Zealand		United States
Table 8-1	Finland	9.2.11	Finland
8.1.5	United States	9.2.12	Finland
8.1.6	United States	9.2.13	Finland
8.1.7	United States	9.2.14	Finland
8.1.8	Finland	9.2.15	Finland
	United States	9.2.16	Finland
8.2.1	United States	9.2.17	Finland
8.2.3	United States	9.2.18	Finland
8.3.4	United Kingdom		United States
8.6.1	United Kingdom	9.2.19	Finland
8.7.2	Norway		United States
	United States	9.2.20	Finland
8.7.3	United States	9.2.21	Finland
8.7.4	United States	9.2.22	Finland
8.7.5	Finland	9.2.23	Finland
	United Kingdom	9.2.24	Finland
8.7.6	United Kingdom	9.2.25	Finland
8.9.7	France	9.2.26	Finland
	United States	9.2.27	Finland
		9.2.28	Finland
Chapter 9	New Zealand	9.2.29	Finland
9.1.1	United States		United States
9.1.6	Belgium	9.2.30	Finland
9.1.12	Finland	9.2.31	Belgium
	United States		Finland
9.2.1	United States	9.2.32	Finland
9.2.2	Finland	9.2.33	Finland
	France	9.2.34	Finland
9.2.3	Finland		France
	France	9.3	France
	United States	9.4.4	Norway
9.2.4	Finland	9.4.5	Norway
	United States		United States
9.2.5	Finland	9.4.16	United States
	United States	9.4.19	Finland
9.2.6	Finland	9.4.20	Finland
9.2.7	Finland		United Kingdom
9.2.8	Finland		United States
9.2.9	Finland		
9.2.10	Finland	Appendix 4	United Kingdom
	France	Appendix 5	Germany
	United Kingdom		

CHAPTER 1

- 1.1 The Austrian regulations distinguish between *aerodrome elevation* according to ICAO Annex 14 for operational purposes and *aerodrome reference elevation* for determining obstruction restrictions.

The aerodrome reference elevation is the elevation of the aerodrome reference point above mean sea level in terms of the nearest metre.

CHAPTER 3

- 3.4.2 Although the regulations of Austria provide a runway end safety area of at least 300 m where the code number is 3 or 4, at some aerodromes the surrounding terrain does not allow to provide the full length as stated in 3.4.2.

CHAPTER 4

- 4.1.25 The term “take-off climb surface” is not used and is therefore not defined.
- 4.2 The specifications concerning approach surfaces are applicable for take-off areas and take-off surfaces as well.

CHAPTER 5

- 5.2.1.5 Additional markings are on aprons, i.e. white for service roads (passenger and service vehicles) and red for parking areas of service vehicles and ramp equipment, orange for limit of apron control competence.
- 5.3.17.10 Exemption may be provided in cases where switched-off taxiway centre lights lead to deterioration of taxi guidance.
- 5.3.24 For the present, road-holding position lights will not be provided. Reason: on the way to runways most vehicles use taxiways with ATC clearances.
- 5.4.3.6 The indication “TORA (RWY)” is added to intersection take-off signs.

CHAPTER 6

- 6.2.12 Flags used to mark obstructions are 0.5 m square and are coloured in either red or yellow.

Comment on implementation:

Chapter 6 will be adopted in accordance with Annex 14 as soon as possible.

CHAPTER 1

- 1.3 Code letter F is not applicable to Brussels/National Airport.

Remark: The present general infrastructure is not suited to code letter F.

CHAPTER 3

- 3.1.9* Runways 07L/25R and 07R/25L are 45 m wide. Runway 02/20 is 50 m wide. The runway width required for code letter F is 60 m.
- 3.2.3* The width of shoulders for runways 07L/25R, 07R/25L and 02/20 is 60 m and not 75 m, as required by code letter F.
- 3.3.7 Obstacle clearance limits are 60 m, not 77.5 m as required for code letter F.
- 3.8.3* The clearance distance between the outer main wheel of the aeroplane and the edge of the taxiway of 4.5 m was planned for code letter E aircraft and not code letter F.
- 3.8.4* Taxiways serving runway 02/20 are 20 m wide and not 25 m, as required by code letter F.
- 3.8.7* The separation distances between: a runway centre line and a taxiway centre line, a taxiway centre line and another taxiway centre line, a taxiway centre line and an object, and a taxilane and an object, throughout the airport, meet code letter E specifications and not those of code F. Taxilane to taxilane distances are 40 m and not 42.5 m as recommended by Annex 14, Volume I, for code letter E.
- Remark:* The design of the taxiways serving runway 25R/07L allows no further widening. The taxiways serving runways 07R/25L and 02/20 could, if necessary, be adapted through considerable investment which is not planned at this time.
- 3.9 Taxiway shoulders meet code letter E specifications and not those of code letter F, with, however, 50 m clearance instead of 44 m for code letter E and 60 m for code letter F.
- 3.11.6 Cat. I stop bars are located at 90 m (code letter E) and they cannot be used by code letter F aircraft (minimum distance 107.5 m). However, the existing Cat. II stop bars meet this requirement.

CHAPTER 5

- 5.3.4.10 The precision approach category I lighting system for runway 20 extends over a distance of 540 m rather than 900 m.
- Remark:* The length will be increased to 630 m in September 2000.
- 5.3.4.22 The precision approach category II lighting system for runway 25R extends over a distance of 600 m rather than 900 m.
- 5.3.4.23
- 5.3.4.24 The precision approach category II lighting system for runway 02 has two fewer centre line barrettes because of the presence of a building at 330 m and a railway line at 570 m.

*Recommended Practice

- 5.3.17.14 The present lighting circuit does not allow selective switching of stop bars. In addition, when a stop bar is illuminated, the taxiway centre line lights installed beyond the stop bar are not extinguished for a distance of at least 90 m. The present level of switching does not allow this.

Comment on implementation: Compliance is planned progressively, and it should be achieved completely by the end of 2001.

- 5.4 The present mandatory instruction and information signs are no longer compliant with respect to colour, location and information.

Comment on implementation: Compliance is planned for 1 January 2001.

CHAPTER 6

- 6.3.4 The low intensity obstacle lights, Type C (mobile obstacle), displayed on vehicles are presently orange/blue instead of yellow/blue.

Comment on implementation: They will be replaced in the course of 2000.

- 6.3.5 The low intensity obstacle lights, Type D, displayed on follow-me vehicles are presently orange instead of yellow.

Comment on implementation: They will be replaced in the course of 2000.

CHAPTER 9

- 9.1.6 The present emergency plan does not contain Human Factors information. It is to be provided henceforth in the emergency operations.

Comment on implementation: Must be developed in the course of 2000.

- 9.2.31 The present personnel training programme does not, at this time, contain information on Human Factors performance.

Comment on implementation: Must be developed in the course of 2000.

CHAPTER 2

- 2.6 Canada prepares and distributes pavement evaluation charts for specific aircraft relative to specific airports upon receipt of a request from an operator. Information required from the operator is: the type of aircraft, the maximum gross weight to be used and the main wheel tire pressure.
- 2.7 Canada does not provide pre-flight altimeter check locations.

CHAPTER 3

- 3.1.12* Canada computes runway longitudinal slopes by dividing the difference between the maximum and minimum runway *end* elevation by the runway length.
- 3.4.1 Canada does not provide runway end safety areas but does provide a 60 m graded strip beyond the runway end.

CHAPTER 4

- 4.1.1 Canada does not establish a conical surface *per se* but takes into consideration areas outside the horizontal surface for obstructions that require marking or removal in order to protect aircraft in the vicinity of an aerodrome.
- 4.1.22 *Comment on implementation:* Length of inner edge of balked landing surface. Canada cannot always meet this requirement during the winter months because of snow accumulation.
- Table 4-1

CHAPTER 5

- 5.1.1.4* Canada does not require that the location of wind direction indicators be marked by a circular band 15 m in diameter but does require that their location be indicated in appropriate aeronautical publications.
- 5.1.2 Landing direction indicators are not used at Canadian aerodromes.
- 5.1.4 Signal areas are not used at Canadian aerodromes.
- 5.2.2.4 Runways within the Canadian Northern Domestic Airspace are designated with reference to true azimuth rather than magnetic azimuth as used in other areas.
- 5.2.7.2* Canada does not provide runway side stripe markings on precision approach runways except where there is a lack of contrast between runway edges and the shoulder or surrounding terrain.
- 5.2.8.2* Canada does not provide taxiway centre line markings on runways where the code number is 1 or 2.
- 5.2.8.7 Canada permits taxiway centre line markings on straight portions of taxiways to be marked with broken longitudinal stripes 3 m in length with 3 m gaps between stripes.
- 5.2.9 Canada does not provide a specific taxiway holding position marking for category II.
- 5.2.10 Canada does not provide taxiway-to-taxiway intersection markings.

*Recommended Practice

- 5.2.11 VOR aerodrome check-point markings are not used at Canadian aerodromes.
- 5.3.3 Identification beacons are not used in Canada.
- 5.3.4.2 Canada does not provide a crossbar in simple approach lighting systems.
- 5.3.4.15 Canada does not use capacitor discharge lights to supplement high-intensity approach lighting systems.
- 5.3.5.1 It is not Canada's policy to provide a visual approach slope indicator system where a runway is served by an electronic precision approach system.
- Remark:* The Canadian standard for visual approach slope indicator systems consists of four light units in the configuration shown for AVASIS for Figure 5-9(D), Annex 14, Volume I, First Edition.
- Figure 5-12 a) Canada provides 9 m wheel clearance for aircraft with eye-to-wheel distance of 13.5 m; 4.5 m wheel clearance for aircraft with eye-to-wheel distance of 7.5 m; and 3 m for aircraft with eye-to-wheel distance of 3 m.
- 5.3.6 Circling guidance lights are not used in Canada.
- 5.3.7 Runway lead-in lighting systems are not used in Canada.
- 5.3.8 Canada refers to this type of lighting as runway identification lights and sites the units 30 m in front of the threshold and 12 m from the edge.
- 5.3.9.7 a) Canada uses blue lights to delineate this area.
- 5.3.10.3 In the case of a displaced threshold, Canada requires wing bar lights consisting of bidirectional threshold and runway end lights for both precision and non-precision approach runways.
- 5.3.14.3 Canada uses blue edge lights in stopways.
- 5.4.2.9 Canada provides only one HOLD sign for category I runway unless the taxiway is more than 45 m in width.
- 5.4.5 Canada does not use aerodrome identification signs.
- 5.5.3.1* Canada does not provide stopway edge markers.

CHAPTER 6

- 6.2.6* In Canada emergency vehicles may be painted either yellow or red.

CHAPTER 7

- 7.2.2* Canada does not use taxiway side stripe markings.

*Recommended Practice

CHAPTER 1

1.1 “Aerodrome” means any area of land or water designed, equipped, set apart or commonly used for affording facilities for the landing and taking-off of aircraft and includes:

- a) any area or space, whether on the ground, on the roof of a building, or elsewhere, which is designed, equipped or set apart for affording facilities for the landing and taking-off of aircraft capable of descending or climbing vertically; and
- b) any such area of land or water or any such area or space, the management of which is vested in the Government or in the Chief Executive,

but does not include any area the use of which for affording facilities for the landing and taking-off of aircraft has been abandoned and has not been resumed.

Comment on implementation: This definition is in line with local legislation. Therefore, withdrawal of the difference is not considered for the time being.

CHAPTER 3

3.8.21* Straight sections at both ends of the bridges on Taxiway W, Taxiway V and Taxiway V4 are not available at the following locations:

Taxiway W to H and vice versa
Taxiway W to V4 and vice versa
Taxiway W to W2 and vice versa
Taxiway V to V4 and vice versa
Taxiway V to H and vice versa

Comment on implementation: This is compensated by the widened bridges (from the required 44 m to 60 m) to overcome possible oversteering. Therefore, withdrawal of the difference is not considered for the time being.

CHAPTER 5

5.2.10 Upon the commissioning of the second runway of the Hong Kong International Airport, taxi-holding position markings at the following locations consist of one solid line and one broken line:

Junction of Taxiway A and Taxiway N
Junction of Taxiway B and Taxiway N
Junction of Taxiway A and Taxiway A4
Junction of Taxiway A and Taxiway A5
Junction of Taxiway A and Taxiway A6
Junction of Taxiway A and Taxiway V
Junction of Taxiway A and Taxiway W
Junction of Taxiway B and Taxiway V
Junction of Taxiway B and Taxiway W
Junction of Taxiway A8 and Taxiway A
Junction of Taxiway H and Taxiway V
Junction of Taxiway H and Taxiway W

* Recommended Practice

Comment on implementation: More positive visual information at the critical taxiing intersection is used in order to provide an enhancement of the markings. Therefore, withdrawal of the difference is not considered for the time being.

5.4.3.30 The TORA sign script on TWY A3, A10, J2 and J8 does not show the arrow as specified.

Remark: The specified taxiways intersect the two runways close to the ends of each runway. It is highly unlikely for the pilots to take-off in the wrong direction because if the wrong direction is taken, only a 100 m length of runway would be available for take-off. Therefore, withdrawal of the difference is not considered for the time being.

CHAPTER 3

3.4.1 Runway end safety areas are not provided at all airports in Greenland.

Remark: Difficult due to terrain.

CHAPTER 3

3.4.4 The following text will be substituted for this Standard:

The width of a runway end safety area shall be at least twice that of the associated runway. However, a width of 90 m is considered sufficient in all cases.

CHAPTER 5

5.3.3.3 This Standard will be implemented as a recommendation only.

Comment on implementation: Standards 5.3.3.1 and 5.3.3.2 are considered to be adequate in determining the operational requirement in Finland. Operational need for an aerodrome beacon or an identification beacon, in Finland, is negligible.

5.3.4.1 C A number of precision approach category I runways in Finland are provided with a high intensity simple approach lighting system with an additional crossbar located 600 m from the threshold.

Remark: For high intensity simple approach lighting systems, see the ICAO *Manual of All-Weather Operations* (Doc 9365), paragraph 6.3.7.

5.3.5.1 c) *Comment on implementation:* Date of applicability: 1 January 2005.

5.3.18.1 *Comment on implementation:* This Standard will be implemented in Finland by 1 January 2005.

5.3.20.1 Finland complies with this Standard but with the following addition:

For runways intended to be used for take-offs only, in runway visual range conditions of less than 550 m, runway guard lights are not required if operational procedures exist to limit the number of:

- 1) aircraft on the manoeuvring area to one at a time; and
- 2) vehicles on the manoeuvring area to the essential minimum.

5.4.1.7 The following text will be substituted for this Standard:

- 1) Signs shall be illuminated, either internally or externally, when intended for use:
 - a) in runway visual range conditions less than 800 m; or
 - b) at night in association with instrument runways; or
 - c) at night in association with runways where the code number is 3 or 4.
- 2) Signs shall be illuminated in accordance with the provisions of Appendix 4 when the runway is intended for landings with runway visual range less than 500 m.

5.4.1.8 The following text will be substituted for this Standard:

Signs shall be retroreflective and/or illuminated when intended for use at night in association with non-instrument runways where the code number is 1 or 2.

CHAPTER 6

6.1.3 Finland complies with this Standard with the following additions:

- a) the marking may be omitted in the case of tree tops forming an obstacle;
- b) the marking may be omitted in the case of terrain forming an obstacle not extending above an obstacle-free zone;
- c) the marking may be omitted in the case of tree tops forming an obstacle not extending above an obstacle-free zone;
- d) the marking may be omitted in the case of tree tops forming an obstacle not considered to constitute a hazard to aeroplanes.

6.3.26 Low intensity obstacle lights displayed in vehicles, including follow-me vehicles, differ from those
Table 6-3 specified in Table 6-3 as to the flash frequency, maximum allowable intensity and vertical beam spread.

Remark: The low intensity obstacle lights used on vehicles (special warning lamps for motor vehicles) are in accordance with the United Nations Agreement Concerning the Adoption of Uniform Conditions of Approval and Reciprocal Recognition of Approval for Motor Vehicle Equipment and Parts, Regulation No. 65, Uniform Provisions Concerning the Approval of Special Warning Lamps for Motor Vehicles.

CHAPTER 7

7.1.4 Finland complies with this Standard with the follow addition:

When the closed marking is used on a temporarily closed runway, it shall be of the form and proportions as detailed in Figure 7-1, illustration a) or b).

CHAPTER 8

8.1.8 For a runway meant for take-off in runway visual range conditions of less than 550 m, a secondary power supply capable of meeting the relevant requirements of Table 8-1 shall be provided.

Table 8-1 In Table 8-1, 550 m is substituted for 800 m.

8.7.5 It is not mandatory for a driver of a radio-equipped vehicle, before entering the apron, to establish radio communication with ATC or the apron management service.

CHAPTER 9

9.1.12 The intervals between full-scale aerodrome emergency exercises will exceed two years.

Remark: A full-scale exercise may cause expenditure of human resources for outside organizations, such as hospitals.

9.2.2 to Rescue and fire fighting services specified in these Standards and Recommended Practices are required only
9.2.34 at those aerodromes having a permanent air traffic service. Military aerodromes open to civil aircraft but not serving scheduled air carrier operations do not meet all of these Standards.

Aerodrome rescue and fire fighting categories 1 and 2 are not applied in Finland, i.e. the aerodrome category shall be at 3.

9.2.6 Finland complies with this Standard with the following addition:

If, during anticipated periods of reduced activity, the highest category of aeroplane planned to use the aerodrome is 1 or 2, protection shall be provided for these operations if the total annual number of operations at the aerodrome is less than 50 000.

9.2.10 Complementary agents are not required at all airports in Finland.

Comment on implementation: Date of applicability: 1 January 2003.

9.4.19 Provision of a temporary threshold marking and early provision of the runway centre line marking are required only when practicable. If a temporary threshold marking is not provided, a temporary threshold shall be indicated with runway threshold identification lights in addition to runway threshold lights and/or wing bar lights. All these shall be high-intensity lights, if applicable.

9.4.20 A light shall be deemed to be unserviceable when the main beam is less than 50 per cent of the value specified in the appropriate figure in Appendix 2.

General comment on implementation: The Standards of Amendment 3 will be implemented in Finland by 7 September 2000.

CHAPTER 1

1.1 In France, the runway-holding position is known as the runway stop position. The intermediate holding position is known as the intermediate stop position.

1.3 The aerodrome classification system adopted in France is a functional one, based on the characteristics of the aviation activities for which the aerodrome is intended, namely:

Category A: Aerodromes intended for long-haul services normally provided under all circumstances.

Category B: Aerodromes intended for medium-haul services normally provided under all circumstances and for some long-haul services provided under the same conditions but which do not involve a long stage on departure from these aerodromes.

Category C: Aerodromes intended for:

- 1 — Short-haul, some medium-haul and even long-haul services which only involve short stages on departure from these aerodromes; and
- 2 — International tourism.

Category D: Aerodromes intended for aeronautical training, recreational flying and tourism or for certain short-haul services.

There is therefore no direct correspondence between the above classification and the aerodrome reference code in Annex 14, Volume I; the following is an approximate table of correspondence.

<i>Category</i>	<i>Reference code</i>
A	4 E
B	4 D
C	3 B to 4 C
D	1 A to 3 C

As a result, it is difficult to make a point-by-point notification of differences, in particular regarding the limitation and removal of obstacles; be that as it may, in this latter field, the applicable specifications guarantee “safety conditions at least equivalent to those provided for in the Standards and Recommended Practices of the International Civil Aviation Organization” (Code of Civil Aviation, Article R.241-3).

CHAPTER 2

2.11.4* The French regulations do not include special provisions to express unavailability of rescue and fire fighting service facilities for periods which are expected to be less than 12 hours.

CHAPTER 3

3.1.15* Minimum radii of curvature are 20 000 m for the runways of Category A aerodromes, 15 000 m for Category B and 5 000 m for Categories C and D.

*Recommended Practice

- 3.4 The application of the new Standard will be studied and it can only be implemented progressively.
- Remark:* There may be obstacles (vegetation) or differences in height after the strip, in the corresponding area in particular on code number 1 and 2 runways. Verification is therefore necessary.
- 3.7.1* A radio altimeter operating area is only established for Category II or III precision approach runways.
- 3.7.3* The width of the radio altimeter operating area for Category II or III precision approaches is 60 m (30 m on each side of the centre line).
- 3.7.4* The characteristics are as follows:
- average longitudinal slope of less than 2 per cent in absolute value
 - no local slopes in excess of 5 per cent in absolute value
 - no local differences in height of more than one metre
- In some cases, when the terrain does not correspond to the average slope characteristics and slope changes, an artificial plane may be used.
- 3.11 The taxi-holding position is known as the runway-stop position.
- 3.11.5 The French Administration takes the following rules into account in determining the stop position:
- 3.11.6
- 3.11.7* a) *Runways used under VFR conditions*
- The distance is determined in relation to the *runway edge* and is at least equal to:
- 30 m for a paved runway less than 1 000 m long, or an unpaved runway; and
 - 50 m for a paved runway 1 000 m long or more.
- b) *Runways used under IFR conditions*
- With non-precision approach: the distance is 75 m from the runway centre line.
 - With precision approach: the distance is at least 150 m from the runway centre line.
- However, in Category I, if markings or signs cannot be located 150 m from the runway centre line, a different distance may be adopted. It must not be less than:
- 90 m if the runway is used by Category D and E aircraft.
 - 75 m if the runway is used by Category A, B or C aircraft.

CHAPTER 4

- 4.1.9 The inner edge of the approach surface is situated at the same elevation as the extended centre line of the runway at right angles to the inner edge.
- 4.1.13 to 4.1.16 The transitional surfaces are known as lateral surfaces.
- 4.1.27 The inner edge of the take-off climb surface is situated at the same elevation as the extended centre line of the runway at right angles to the inner edge.
- 4.2.1 Some Category D aerodromes do not have a conical surface.

* Recommended Practice

- 4.2.9 The runway approach surfaces at aerodromes in Categories A, B and C are horizontal above the higher of the following two levels:
- 150 m above the inner edge; and
 - 100 m above the terrain.
- 4.2.17 The runway approach surfaces at aerodromes in Categories A, B and C are horizontal above the higher of the following two levels:
- 150 m above the inner edge; and
 - 100 m above the terrain.

CHAPTER 5

- 5.2.1.5 The taxiway markings are yellow except when a taxiway centre line splits, in which case one of the split centre lines is blue and the other orange.
- 5.2.3.3 For blacktop runways used in VFR conditions or in IFR conditions (excluding precision approaches), and
5.2.3.4 for concrete runways used solely in VFR conditions, the French Administration authorizes the use of a
5.2.4.5 simplified marking.
- 5.2.5.2 The aiming point markings are put on all runways 1 500 m in length or longer.
- 5.2.5.5 For blacktop runways used in VFR conditions or in IFR conditions (excluding precision approaches), and for concrete runways used solely in VFR conditions, the French Administration authorizes the use of a simplified marking.
- 5.2.7.2* French regulations do not require the systematic provision of runway side stripe markings on precision approach runways.
- 5.2.10.1* When a precise holding limit has to be defined, an intermediate stop position marking will be used.
- 5.3.3.12 In France, identification beacons may show flashing-white rather than flashing-green.
- 5.3.4.1 B The French regulations do not require the regular provision of approach lighting systems for non-precision approach runways.
- C The French regulations do not require the regular provision of approach lighting systems for Category I precision approach runways.
- D The French regulations do not require the regular provision of approach lighting systems for Category III precision approach runways if they are not also used for Category II precision approaches.
- 5.3.5.1 a) The French regulations do not require the regular provision of visual approach slope indicators to serve a runway used by turbojet or other aeroplanes with similar approach guidance requirements.
- 5.3.12.3 Runway centre line lights are mandatory for take-off in low visibility when the runway visual range (RVR) is lower than 250 m for aircraft of Categories A, B and C and 300 m for aircraft of Category D.

*Recommended Practice

- 5.3.15.1 and 5.3.15.2* Taxiway centre line lights are systematically provided only on taxiways with an RVR of less than 150 m.
- 5.3.15.3* The French Administration applies this provision only in the case of taxiing on an inactive runway and with an RVR of less than 150 m.
- 5.3.16.2 The French Administration does not apply this provision.
- 5.3.17.1 The French Administration only requires the provision of stop bars for Category II and III precision approach runways except on aerodromes with light traffic (Categories II and III) where taxiing in the manoeuvring area is limited to one aircraft at a time.
- 5.3.17.2* 5.3.17.3
- Remark:* In view of the lower RVR limits mentioned, 350 m and 550 m, and the take-off minima authorized by European regulations, this Standard would require the installation of stop bars on most runways. This is unfeasible. This is why only Category II and III runways have been considered.
- 5.3.17.14 c) The centre line lights will not be visible from the entry side.
- 5.3.18 The French Administration has no plans to provide taxiway intersection lights.
- 5.3.20.1 The runway guard lights (Configuration A, Figure 5-23) are installed in France at all the runway-stop positions on Category II and III precision approach runways in the absence of stop bars. Their installation is recommended at aerodromes with high traffic density.
- Remark:* In view of the RVR limits mentioned, 550 m and 1 200 m, and the take-off minima authorized by European regulations, this Standard would require the installation of runway guard lights on almost all runways. This is unfeasible.
- 5.4.1.6 The French Administration does not fully apply the provisions of Appendix 4. Sign inscription heights may be lower than the ones mentioned in that Appendix.
- 5.4.2 The French Administration has established an installation schedule that should end on 31 December 2000.
- Remark:* Upgrading all French airfields to the Standards requires very considerable investment and work.
- 5.4.2.5 The French Administration only provides for the installation of the mandatory instruction signs specified in 5.4.2.8 (runway designation signs) and/or 5.4.2.9 (category I, II or III stop-position signs) at the runway-stop positions.
- Remark:* Upgrading all French airfields to the Standards requires very considerable investment and work.
- 5.4.2.8 In France, the signs specified in 5.4.2.8 are installed at least on the left side of the runway.
- Remark:* Upgrading all French airfields to the Standards requires very considerable investment and work. Consultation is necessary before adopting this Standard.
- 5.4.2.10 In France, it is not intended to require the installation of the runway-stop position sign (example “B2”) at runway-stop positions.
- Remark:* It can be understood that there is sometimes a need to use this type of sign in the case of multiple stop positions, but it should not be required systematically. Runway designation signs are already often complemented by a location sign (example “B”).

*Recommended Practice

5.4.2.14 The Cat. II or Cat. III inscription is always placed closest to the taxiway and the runway designation is on the outside.

20-02 Cat. III left-side sign	Cat. III 20-02 right-side sign
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5.4.3.3 Information signs also include special signs and frequency reminder signs.

Frequency reminder signs:

When passing from one area of responsibility to another, it may be useful to remind pilots or drivers of vehicles of the frequency associated with the area that they are entering; it is therefore that frequency which is displayed on the sign.

5.4.3.5 Runway vacated signs are only provided for Category II and III precision approach runways.

5.4.3.7* At some complex intersections, signs displaying a combination of different types of information may be used where required.

5.4.3.10* Signs of the same type as the runway-stop position signs (example “B2”) will be installed at the intermediate stop positions at least on the left side of the taxiway.

5.4.3.21 In France, the intersection take-off signs will be installed at least on one side of the taxiway, right or left.

5.4.3.30 In France, the inscriptions on these signs will indicate the value of the distance remaining to the end of the runway (TORA) expressed in metres, but the letter “m” of the unit will not be displayed. The runway designation may also be mentioned.

Remark: The fact of not specifying the unit “m” does not jeopardize safety since confusion with units in feet would give a shorter distance which would alert the pilot.

CHAPTER 7

7.3.1* The French Administration establishes 100 m as the minimum length beyond which a paved pre-threshold area not suitable for normal use must be marked with a chevron marking.

CHAPTER 8

8.9.7* The French regulations do not provide for the systematic use of surface movement radar for the manoeuvring area.

CHAPTER 9

9.2.2 The French Administration will not be in a position to apply this Standard in January 2000. The French
9.2.3* Administration makes a distinction between flights planned with sufficient time in advance and other flights.

*Recommended Practice

- 9.2.10 The French regulations for aerodrome Categories I and II require the following amounts of extinguishing agents:

Category I	50 kg powder or halons
Category II	250 kg powder or halons

- 9.2.34 The French regulations provide for the use of respiratory equipment only at aerodrome Category IV or higher.

- 9.3 The French Administration does not apply the provisions of this paragraph.
-

CHAPTER 2

- 2.1.5 Publishing of the aerodrome reference points in WGS-84 will be an ongoing task for some time after the
 2.1.6 date of applicability of Amendment 2.

Appendix 5

Table 1 In Germany the description of obstacles differs as follows from what is given in these tables.

Table 2

- a) Obstacles in the circling area for non-precision and turning departures and at the aerodrome.
- b) Significant obstacles in the precision approach and straight departure area.

Table 2 The WGS-84 geoid undulation at aerodrome elevation position will not be published in Germany.

Remark: This item need not be published because for non-precision approaches the MDH is referred to the threshold position at all German IFR aerodromes.

Table 1 Threshold, runway end: for a few IFR aerodromes these positions cannot be published as from the date of
 Table 5 applicability.

2.1.5

2.1.6 *Remark:* Some more time is needed because these positions must be brought into conformity with the declared distances specified in the aerodrome licensing document (a formal act of approval by the National administration).

Comment on implementation:

Annex provision

Proposed date of implementation

Appendix 5 It is not intended to comply with this provision.

Table 1

Table 2

CHAPTER 3

3.4.2 A runway end safety area is 40 m.

Comment on implementation: No amendment to the current regulation is intended.

CHAPTER 5

5.3.5.42 The length of the obstacle protection surface is 7 400 m.

Comment on implementation: It is difficult to establish the obstacle protection surface of 15 000 m in length because of mountainous terrain. No amendment to the current regulation is intended.

5.3.14 No provision.

CHAPTER 6

6.3.25 The colour of low intensity obstacle lights displayed on vehicles associated with emergency or security is flashing red.

Date of implementation: March 2005 (provisional).

CHAPTER 3

- 3.3.2 In the regulations applied in Kyrgyzstan, this segment is reinforced (with pavement) and is 50 m in size with a reduction down to 2/3 of its width at the end of the reinforced segment where the code number is 4.

Remark: The implementation of reinforced segments of this size was based on the previous regulatory document “Standards of operational serviceability of the civil aerodromes in the USSR”.

CHAPTER 2

- 2.1.3 The Netherlands is not making use of CRC to protect the integrity level of critical and essential electronic aeronautical data.
- 2.1.7 In the Netherlands the geoid undulation at the aerodrome elevation position and the geoid undulation of
2.3.1 the threshold will not be published.
2.3.2
2.3.3
- 2.5.3 In the Netherlands it is not yet considered necessary to determine the geographical coordinates of the taxiway centre line points in terms of the World Geodetic System — 1984 (WGS-84) geodetic reference datum.
- 2.5.4 In the Netherlands it is not yet considered necessary to determine the geographical coordinates of the aircraft stands in terms of the World Geodetic System – 1984 (WGS-84) geodetic reference datum.
- 2.6.2 a) For pavements intended for aircraft of apron (ramp) mass greater than 6 000 kg, the pavement classification number (PCN) shall be reported.
- 2.6.5 The behaviour of a pavement may be classified as rigid (R), flexible (F), special-rigid (SR) or special-
2.6.6 a) flexible (SF).
- When classified as special, the standard procedures for determining the ACN-value of an aircraft as given in the *Aerodrome Design Manual*, Part 3, are not applicable, and therefore, the reported PCN-value is only of indicative value for the present fleet of aircraft.
- 2.6.8 For pavements intended for aircraft of apron (ramp) mass equal to or less than 6 000 kg and for unpaved airfields in general, the bearing strength shall be reported by the method described in this paragraph.
-

General Comment: New Zealand's Civil Aviation Rules (CAR) Part 139: Aerodromes — Certification, Operation and Use, is currently being reviewed. More comprehensive advice regarding New Zealand's differences to Annex 14, Volume I, will be provided following issuance of CAR Part 139, which is expected late in 2000.

CHAPTER 1

General
Table 1-1 New code letter F for aeroplanes with a wing span of 65 m up to but not including 80 m and an outer main gear span of 14 m up to but not including 16 m.

Remark: This requirement will be included in the review of the Civil Aviation Rules Part 139.

Comment on implementation: On issuance of the revised Civil Aviation Rules Part 139, due late 2000.

CHAPTER 3

General Provisions related to code letter F aeroplanes.

3.3.2 Length of runway strips.

3.3.7 a) Objects on runway strips.

Remark: These requirements will be included in the review of the Civil Aviation Rules Part 139.

Comment on implementation: On issuance of the revised Civil Aviation Rules Part 139, due late 2000.

3.4.1 General

3.4.2 Dimensions of runway end safety area (RESA).

3.4.3*

Remark: The requirement for RESA is under consideration, and it will be some months before some resolution is finalized.

Comment on implementation: Under consideration.

3.14 New specifications on de/anti-icing facilities.

Remark: These requirements will be included in the review of the Civil Aviation Rules Part 139.

Comment on implementation: On issuance of the revised Civil Aviation Rules Part 139, due late 2000.

CHAPTER 4

Table 4-1 Requirements for code letter F aeroplanes.

Remark: This requirement will be included in the review of the Civil Aviation Rules Part 139.

Comment on implementation: On issuance of the revised Civil Aviation Rules Part 139, due late 2000.

CHAPTER 5

Revised specifications on runway-holding position marking, intermediate holding position marking, runway centre line lights, taxiway centre line lights, stop bars, intermediate holding position lights and runway guard lights.

* Recommended Practice

Specifications on mandatory instruction markings, marking and lighting of de/anti-icing facilities, alternative approach and runway lighting for precision approach runways where the serviceability levels of lights can be demonstrated and intersection take-off signs.

Remark: These requirements will be included in the review of the Civil Aviation Rules Part 139.

Comment on implementation: On issuance of the revised Civil Aviation Rules Part 139, due late 2000.

CHAPTER 6

Table 6-2 Revised specifications on lighting of obstacles, characteristics of obstacle lights and installation setting
Table 6-3 angles for high-intensity obstacle lights.

Remark: These requirements will be included in the review of the Civil Aviation Rules Part 139.

Comment on implementation: On issuance of the revised Civil Aviation Rules Part 139, due late 2000.

CHAPTER 8

Requirements for switch-over times for precision approach runways, Category I, where approaches are over hazardous or precipitous terrain and revised requirements for switch-over times for runways meant for take-off in runway visual range conditions between 550 m and 800 m.

Revised provisions concerning frangibility of non-visual aids on operational areas.

Remark: These requirements will be included in the review of the Civil Aviation Rules Part 139.

Comment on implementation: On issuance of the revised Civil Aviation Rules Part 139, due late 2000.

CHAPTER 9

Provisions concerning a system of preventive maintenance to be employed for precision approach runways, Categories II and III, as well as provisions concerning Human Factors issues.

Remark: These requirements will be included in the review of the Civil Aviation Rules Part 139.

Comment on implementation: On issuance of the revised Civil Aviation Rules Part 139, due late 2000.

CHAPTER 2

- 2.9.6 Norway does not use the method described for continuous friction measuring devices.

Remark: We regard the measured information concerning slippery runway conditions in Norway to be too inaccurate to be published for official use.

CHAPTER 3

- 3.4.1 A runway end safety area is not provided at the end of a runway strip where the code number is 1 or 2 and the runway is an instrument one. It is physically difficult, in some cases impossible, to establish a runway end safety area at the end of the runway strip at Norwegian aerodromes where the code number is 1 or 2.

CHAPTER 5

- 5.2.1.4 Runway markings shall be yellow.

Remark: The reason for using yellow markings is due to the need for improved visual references during the winter season when runways are covered with ice and snow.

- 5.3.10.1 Runway threshold lights are provided with use of wing bars only on precision approach runways, Cat I.

Remark: In Norway, most precision approach runways have displaced thresholds. When thresholds are displaced, the threshold lights must be inset into the pavement. During the winter season, difficulties have been experienced in keeping inset lights clear of ice and snow. Norway regards the use of wing bars as threshold lights sufficient for satisfying the needs of Cat I operations.

CHAPTER 6

- 6.1.5 When the terrain is regarded as an obstacle, above an obstacle protection surface, obstacles of this type are normally not marked and lighted, even if the runway is used at night.

- 6.3.9* When the terrain is regarded as an obstacle, above an obstacle protection surface, obstacles of this type are usually not displayed with top lights.

CHAPTER 8

- 8.7.2 b) Some of the equipment required for air navigation purposes, penetrating the inner approach surface and the inner transitional surface, are not frangible.

Remark: The reason for using non-frangible equipment is due to climactic conditions in Norway.

CHAPTER 9

- 9.4.4* Norway does not regard the method described, for using a continuous friction measuring device, as satisfactory in order to be able to publish necessary information concerning slippery conditions.

* Recommended Practice

CHAPTER 3

- 3.4.1 Runway end safety areas, as specified in Amendment 3 to Annex 14, Volume I, cannot be implemented at
 3.4.2 the following international airports:
 3.4.3*

Lisboa (LPPT) — Runway 17
 Funchal (LPFU)
 Faro (LPFR)
 João Paulo II (LPPD)
 Horta (LPHR)
 Flores (LPFL)

Remark: The differences reported herein result from physical or environmental constraints. The individual constraints are as follows:

Lisboa, Runway 17: A road is located at the end of runway 17.

Funchal: A complete renewal project is in progress.

João Paulo II and Horta: The runways are located in the periphery of islands. The compliance process is dependent on a change in the declared distances and a corresponding runway lighting system modification.

Faro: The airport is located in an environmentally protected area. Any modification of the land use is dependent on an environmental impact evaluation.

Comment on implementation:

Existing infrastructures:

Porto (LPPR): will comply by 4 November 1999
 Santa Maria (LPAZ): will comply by 4 November 1999
 Porto Santo (LPPS): will comply by 4 November 1999
 Lisboa (LPPT) runways, 03, 21, 35: will comply by 4 November 1999
 Funchal (LPFU): will comply after 31 December 2000
 Flores (LPFL): will comply after 31 December 2000
 João Paulo II (LPPD): will comply after 2001.

The compliance date after 4 November 1999 will be notified for each airport through the specific Aeronautical Information Publication (AIP, NOTAM CIA). The precise compliance date is subordinated to the planning of the corresponding correction project and the result of an in-depth evaluation of the operational and safety consequences.

New infrastructures:

Will comply with the provisions of Annex 14, Volume I, including all amendments up to and including Amendment 3.

* Recommended Practice

CHAPTER 1

- 1.3 The basic aerodrome classification is the length of the paved runway. Aerodromes are subdivided into six classes. In standardizing the taxiway requirements, aeroplanes are subdivided into six groups (index numbers) depending on wing span and wheel span. For the largest (index number 6) aeroplanes, a wing span of up to 65 m and a wheel span of up to 14 m are used. The requirements for index number 6 aeroplanes also apply to aeroplanes with a wing span of up to 75 m and a wheel span of up to 10.5 m.

Remark: The national use of a wing span value of 75 m is due to the operation of An-124 type aeroplanes, with a wing span of 73.3 m, at aerodromes. Larger aeroplanes are not currently being used at the country's aerodromes.

CHAPTER 3

- 3.1.2* The value of the maximum permissible cross-wind component varies from 6 to 12 m/s (from 21.6 to 43.2 km/h) as a function of the aerodrome category.
- 3.1.16* The requirement to provide a line of sight over the entire length of the runway, where a parallel (main) taxiway is not available, is not used. There is a general requirement for a line of sight of not less than half the runway length from a height of 3 m, regardless of the availability of a main taxiway.
- 3.2.3* Shoulders are not provided with a runway width of 60 m or more.
- 3.3.7 The width of the obstacle-free part of the runway strip is taken to be 60 m from the runway centre line for all aerodrome categories.
- 3.4 Runway end safety areas are not used. Their functions are performed by sections of the runway strip located beyond the runway ends.
- 3.6.4* The requirement to provide a stopway coefficient of friction equal to that of the adjacent runway is not used.
- 3.7 The requirements for the radio altimeter operating area are not used.
- 3.8.4* The taxiway width is from 7 to 22.5 m as a function of the aeroplane code (group).
- 3.8.7* As a function of the aeroplane code (group), the distance between parallel taxiway centre lines is from 38 to 95 m; the distance between a taxiway centre line and an object is from 22 to 55 m; the distance between an aircraft stand taxiway centre line and an object is from 16 to 45 m.
- 3.8.20* The requirement to provide access for rescue and fire fighting vehicles to aeroplanes on a taxiway bridge is not used.
- 3.9.1* The overall width of the taxiway with two shoulders is from 27 to 40.5 m as a function of the aeroplane code.
- 3.10 The requirements for taxiway strips are not used.
- 3.11.4* The requirement for an intermediate holding position on a taxiway is not used.
- 3.14 The requirements for de/anti-icing facilities are not used.

* Recommended Practice

CHAPTER 4

- 4.2 Insignificant differences relate to the dimensions and slopes of the obstacle limitation surfaces. The obstacle limitation surfaces are differentiated according to the runway (aerodrome) categories and to the extent to which the runway is equipped with landing aids.

CHAPTER 5

- 5.2.5 The aiming point is not used. Its functions are performed by the fixed distance area (300 m from the threshold).
- 5.2.7.1 The requirement for a runway side stripe marking, where there is a lack of contrast between the pavement and the adjacent area of the runway strip, is not used. There is a requirement for a side stripe marking for a precision approach runway.
- 5.2.9.3 Marking of additional runway-holding positions is not used.
- 5.2.9.7 The runway-holding position marking at a runway/runway intersection is not used.
- 5.2.10 The intermediate holding position marking at taxiway intersections is not used. The taxiway intersection positions are designated by taxiway signs.
- 5.2.11 The VOR aerodrome check in marking is not used.
- 5.2.14 The road-holding position marking is not used.

CHAPTER 6

- 6.2.4* Alternating horizontal bands 0.5 to 6 m wide are used to mark an object up to 100 m high. Not less than 1/3 of the height of the object is marked.

CHAPTER 7

- 7.1 Marking of closed runways and taxiways or parts thereof is not used.
- 7.3 Different markings in terms of shape, dimensions and colour are used to designate the runway displaced threshold.

* Recommended Practice

CHAPTER 1

- 1.1 South Africa will retain the use of the wording “Taxi-Holding Position” and “Taxi-Holding Position Marking”.

Remark: To avoid confusion when such markings are used on taxiway crossings.

CHAPTER 5

- 5.2.9 South Africa will retain the use of the wording “Taxi-Holding Position” and “Taxi-Holding Position Marking”.

Remark: To avoid confusion when such markings are used on taxiway crossings.

CHAPTER 2

2.9.9* Given the climate of our country, the proposed Recommendation is not applied.

CHAPTER 3

3.1.11* The minimum distance between parallel runways intended for independent parallel approaches is 1 310 m.

3.3.2 It is considered that not all of the airports will have been adapted to the Standard concerning the length of runway strips by 1 January 2009.

3.4.3* This Recommended Practice is not complied with in Spain.

3.7 The Recommendation to establish radio altimeter operating areas is applied at those airports requiring category II/III precision approaches.

CHAPTER 5

5.2.15 In Spain, the character height for information markings is normally 2 m.

5.3.5 On 31 December 1999, the seven thresholds of four runways at which VASIS systems still operate at the present time will have operational PAPI systems.

5.3.17.10 The current facilities are not adapted to this Standard.

5.3.22 By 31 December 1999, all visual docking guidance systems will comply with the specifications.

5.4 Adaptation to the corresponding provisions will be completed during 2001.

CHAPTER 6

6.3.16 This provision is not applied, as ICAO requirements differ from those in our Traffic Code.

* Recommended Practice

CHAPTER 5

5.2.5 1 January 2005.

Remark: Swedish regulations contain requirement only for code 4.

5.2.6 1 January 2005.

Remark: Swedish regulations contain requirement only for code 4.

5.2.16.1 Swedish regulations contain no requirement.

Remark: Information markings are deemed to have limited use, given the winter conditions. Signs are required to the extent necessary.

CHAPTER 6

General comment: Swedish regulations do not fully correspond with Annex 14. National requirements will be reviewed within the next three years.

CHAPTER 5

5.3.5 In general, we do not install a visual approach slope indicator system on a precision approach runway.

CHAPTER 6

6.2.9* The spacing between two markers, where the marker diameter is 60 cm, may be increased to a 40 m maximum.

Remark: For reasons of uniformity, it is not possible to change given the large number of marked installations in our country.

6.3.3* 3×80 cd occulting lights may also be used instead of medium-intensity lights.

Remark: Proven practice, high reliability of the lights and good visibility from all angles.

* Recommended Practice

CHAPTER 2

2.6 PCN for pavements has not been determined. LCN method still in use.

CHAPTER 1

1.1 Aerodrome traffic density; Runway holding point; Intermediate holding point — currently not adopted.

Remark: Pending internal assessment and external consultation.

CHAPTER 3

3.1.13* UK uses 2.5 per cent where the code is 2; 3 per cent where the code is 1.

Remark: These criteria have been in use for many years; no evidence to suggest they are inadequate.

3.1.14* UK uses 3 per cent where the code is 1.

Remark: These criteria have been in use for many years; no evidence to suggest they are inadequate.

3.3.12* UK uses 2 per cent where the code is 3; 2.5 per cent where the code is 2; 3 per cent where the code is 1.

Remark: These criteria have been in use for many years; no evidence to suggest they are inadequate.

3.4.3 UK uses 30 m for code 1 and 2 instrument runway.
No provision for code 1 and 2 visual runway.

Remark: These criteria have been in use for many years; no evidence to suggest they are inadequate.

3.4.9* UK allows up to 10 per cent down slope.

Remark: Only permitted after aeronautical study determines acceptability.

3.5.4* UK allows 2 per cent up slope where the codes are 1 and 2.

Remark: Only permitted after aeronautical study determines acceptability.

3.8.7*	Column	(10)	(11)
Table 3-1	Code A	21.0	13.5
	Code B	31.5	19.5

Remark: The distances used are adequate for the operation involved.

Table 3-2 Code 4 precision approach categories I, II, III, note 'c' — currently not adopted.

Remark: Pending internal assessment and external consultation.

CHAPTER 4

Table 4-1 Balked landing surface, inner edge, note 'e' — currently not adopted.

Remark: Pending internal assessment and external consultation.

* Recommended Practice

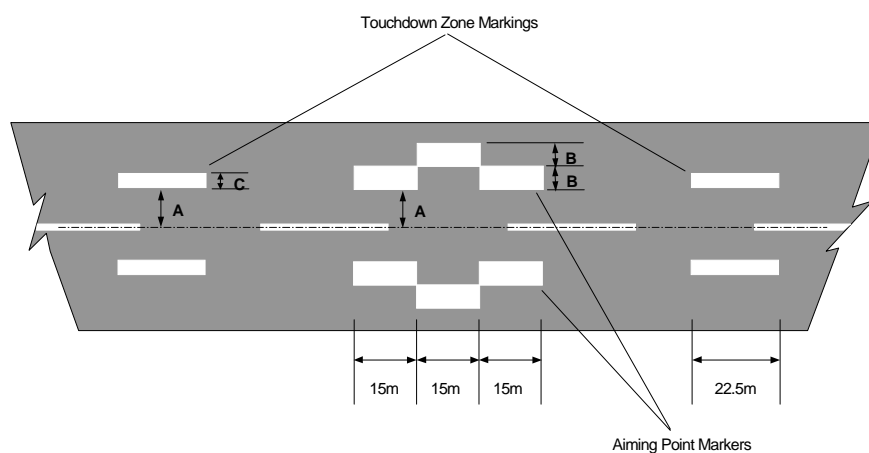
CHAPTER 5

5.2.4.3* Not required in UK.

Remark: The use of grass runways for public transport operations in the UK is limited and the use of non-paved runway markings is an over provision.

5.2.5.5 The UK uses a different style of aiming point marking, as illustrated below.

Remark: The UK considers that the ICAO standard aiming point marking is insufficiently conspicuous.



Runway width (m)	Distance A runway C/L to marker (m)	Marker width B (m)	Marker width C (m)
45	9	5.5	3
30	3	5	3
23	5	2.5	1.5
18	3	2.5	1.5

5.2.8.1 Taxiway centre line marking from de/anti-icing facility and apron between runway centre line and aircraft stands — currently not adopted.

Remark: Pending internal assessment and external consultation.

5.2.15 Mandatory instruction marking — currently not adopted.

Remark: Pending internal assessment and external consultation.

5.3.4.15 Composition of approach centre line lights where serviceability level of lights can meet maintenance objective in 9.4.29 — currently not adopted.

Remark: Pending internal assessment and external consultation.

* Recommended Practice

- 5.3.4.22 Composition of approach lights where serviceability level of lights can meet maintenance objective in 9.4.26 — currently not adopted.
- Remark:* Pending internal assessment and external consultation.
- 5.3.4.24 Composition of approach lights (side rows) where serviceability of lights can meet maintenance objective in 9.4.26 — currently not adopted.
- Remark:* Pending internal assessment and external consultation.
- 5.3.4.30 Composition of Cat II/III centre line approach lighting where serviceability of lights can meet maintenance objective in 9.4.26 — currently not adopted.
- Remark:* Pending internal assessment and external consultation.
- 5.3.4.32 Composition of approach lights where serviceability can meet maintenance objective in 9.4.26 — currently not adopted.
- 5.3.4.33
- Remark:* Pending internal assessment and external consultation.
- 5.3.5.42 UK uses a plane 1° below lower boundary of on slope signal originating 90 m from units where LDA 1 200 m or greater, 60 m where LDA 800 m – 1 199 m and 30 m where LDA <800 m, diverging at 15° from runway edge out to 15 NM.
- Remark:* This practise has been in existence since PAPI was originally designed; no safety related incidents to justify introducing more penalizing criteria.
- 5.3.12.2* Not required in UK.
- Remark:* No demonstrated safety benefit. Markings and HI edge lights considered sufficient.
- 5.3.12.4* Not required in UK.
- Remark:* No demonstrated safety benefit. Markings and HI edge lights considered sufficient.
- 5.3.15.1 Provision of continuous taxiway lights between runway and stands in RVR less than 350 m — currently not adopted.
- Remark:* Pending internal assessment and external consultation.
- 5.3.15.7 UK uses amber/green both ways within OFZ.
- Remark:* The pattern is intended to remind pilots when they are within OFZ/ILS protected areas.
- 5.3.15.11 c)* UK uses 30 m spacing for taxiways used in RVR 200 m and above, 15 m spacing when used in RVR <200 m.
- Remark:* Tests and practical experience confirm that spacing is sufficient.
- 5.3.15.13* UK uses 15 m spacing for taxiways used in RVR 200 m and above, 7.5 m where used in RVR <200 m.
- Remark:* Tests and practical experience confirm that spacing is sufficient.

*Recommended Practice

- 5.3.15.17* UK uses 15 m spacing for exits used in RVR 200 m and above, 7.5 m where used in RVR <200 m.
Remark: Tests and practical experience confirm that spacing is sufficient.
- 5.3.15.18* UK uses 30 m spacing for taxiways used in RVR 200 m and above, 15 m spacing where used in RVR <200 m.
Remark: Tests and practical experience confirm that spacing is sufficient.
- 5.3.16.6 UK also uses omni-directional taxiway edge lights. Use of omni-directional edge lights is gradually being phased out.
- 5.3.19 De/anti-icing facility exit lights — currently not adopted.
Remark: Pending internal assessment and external consultation.
- 5.3.22.11* UK uses systems not aligned for use by both pilots.
Remark: Many of these systems were in use before guidance material was produced. They are gradually being replaced with compliant units.
- 5.3.22.14 UK uses systems where pilot has to turn head.
Remark: Pending internal assessment and external consultation.
- 5.3.22.16* UK uses systems not aligned for use by both pilots.
Remark: Pending internal assessment and external consultation.
- 5.4.1.9 Blank face on variable message sign — currently not adopted.
Remark: Pending internal assessment and external consultation.
- 5.4.2.8 Runway designation sign location — currently not adopted.
Remark: Pending internal assessment and external consultation.
- 5.4.3.5 Not used in UK.
Remark: UK uses a location sign.
- 5.4.3.14* UK uses taxiway ending sign but not just at ‘T’ junctions.
Remark: UK uses a taxiway ending sign which is a location sign with a yellow diagonal.
- 5.4.3.17 Not all runway exit signs on same side of runway as exit.
Remark: Location is on same side where possible.
- 5.4.3.21 Location of intersection take-off sign — currently not adopted.
Remark: Pending internal assessment and external consultation.

* Recommended Practice

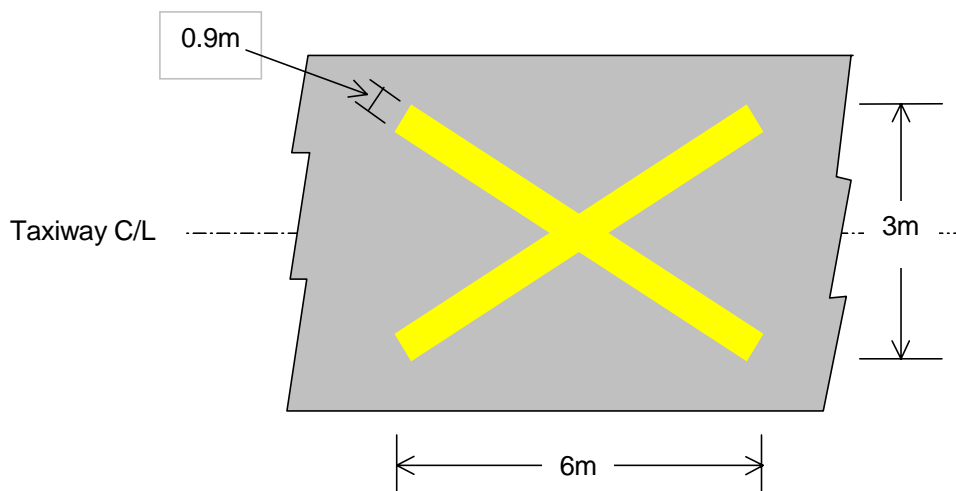
- 5.4.3.25* Taxiway ending sign at 'T' junctions not always located as specified.
Remark: Taxiway ending signs should be located well before end of taxiway.
- 5.4.3.26 Not used in UK.
- 5.4.3.27 All UK location signs have yellow border.
- 5.4.3.30 Inscription on intersection take-off sign — currently not adopted.
Remark: Pending internal assessment and external consultation.
- 5.5.3.1* Not used in UK.
Remark: When standard marking agreed, UK will implement.
- 5.5.3.2 Not used in UK.
Remark: When standard marking agreed, UK will implement.

CHAPTER 6

- 6.2.8* Not required in UK.
- 6.3.16 Provision of medium-intensity obstacle lights Type A/B/C — currently not adopted.
- 6.3.17
- 6.3.18 *Remark:* Pending internal assessment and external consultation.

CHAPTER 7

- 7.1.4 UK uses elongated legs 0.9 m wide as illustrated:



* Recommended Practice

7.2.2* Inner edge marks outer edge of load-bearing surface.

CHAPTER 8

8.3.4* Not used in UK.

Remark: UK is working on minimum acceptable levels of lighting.

8.6.1 Design and construction of new facilities to incorporate security measures — currently not adopted.

Remark: Pending internal assessment and external consultation.

8.7.5 Location of equipment or installation with reference to runway strip and extended centre line — currently not adopted.

Remark: Pending internal assessment and external consultation.

8.7.6 Frangibility and mounting of equipment or installations located on or near Cat. I/II/III precision approach runways — currently not adopted.

Remark: Pending internal assessment and external consultation.

CHAPTER 9

9.2.10 At all aerodromes, up to 50 per cent of the complimentary media may be replaced by water for foam production to performance level B.

9.4.20 Serviceability requirements for lights in visual aids — currently not adopted.

Remark: Pending internal assessment and external consultation.

Appendix 4

paragraph 11 Not specified in UK.

CHAPTER 1

1.1 De/anti-icing facility definition was revised to include slush as another form of contamination to be removed. Holdover time definition revised to include commencement of holdover time for one-step procedures.

1.2.1 Airports in the United States are for the most part owned and operated by local governments and quasi-governmental organizations formed to operate transportation facilities. The Federal government provides air traffic control, operates and maintains navaids, provides financial assistance for airport development, certifies major airports and issues standards and guidance for airport planning, design and operational safety.

There is general conformance with the Standards and Recommended Practices of Annex 14, Volume I. At airports with scheduled passenger service using aircraft having more than nine seats, compliance with Standards is enforced through regulation and certification. At other airports, compliance is achieved through the agreements with individual airports under which federal development funds were granted; or, through voluntary actions.

1.3.1 In the United States the Airport Reference Code is a two-component indicator relating the standards used
 1.3.2 in the airport's design to a combination of dimensional and operating characteristics of the largest
 1.3.3 aircraft expected to use the airport. The first element, Aircraft Approach Category, corresponds to the
 1.3.4 ICAO PANS-OPS approach speed groupings. The second, Airplane Design Group (ADG), corresponds to the wingspan groupings of code element 2 of the Annex 14, Aerodrome Reference Code. See below:

Airport Reference Code (ARC)

Aircraft Approach Category	Approximate Annex 14 Code Number	
A	1	Airport designed for B747-400 ARC D-V
B	2	
C	3	
D	4	
E	—	
Airplane Design Group	Corresponding Annex 14 Code Letter	
I	A	
II	B	
III	C	
IV	D	
V	E	
VI	F (proposed)	

CHAPTER 2

2.2.1 *Comment on implementation:* The aerodrome reference point is recomputed when the ultimate planned development of the aerodrome is changed.

- 2.9.6 Minimum friction values have not been established to indicate that runways are “slippery when wet”.
 2.9.7 However, United States guidance recommends that pavements be maintained to the same levels indicated in the ICAO *Airport Services Manual*.
- 2.11.3 If an inoperative piece of fire fighting apparatus cannot be replaced immediately, a Notice to Airmen must be issued. If the apparatus is not restored to service within 48 hours, operations shall be limited to those compatible with the lower Index corresponding to operative apparatus.
- 2.12 e) Where the original VASI is still installed, the threshold crossing height is reported as the centre of the on-course signal, not the top of the red signal from the downwind bar.

CHAPTER 3

- 3.1.2* The cross-wind component is based on the Airport Reference Code (ARC): 10.5 kt for AI and BI; 13 kt for AII and BII; 16 kt for AIII, BIII and CI through DIII; 20 kts for AIV through DVI.
- 3.1.9* The runway widths (metres) used in design are below:

Width of runway (metres)

Aircraft Approach Category	Airplane Design Group					
	I	II	III	IV	V	VI
A	18 ¹	23 ¹	–	–	45	60
B	18 ¹	23 ¹	–	–	45	60
C	30	30	30 ²	45	45	60
D	30	30	30 ²	45	45	60

¹The width of a precision (lower than 1 200 m approach visibility minimums) runway is 23 m for a runway which is to accommodate only small (less than 5 700 kg) aeroplanes and 30 m for runways accommodating larger aeroplanes.

²For aeroplanes with a maximum certificated take-off mass greater than 68 000 kg, the standard runway width is 45 m.

- 3.1.12* Longitudinal runway slopes of up to 1.5 per cent are permitted for aircraft approach Categories C and D, except for the first and last quarter of the runway where the maximum slope is 0.8 per cent.
- 3.1.16* Runway profiles permit any two points five feet (1.5 m) above the runway centre line to be mutually visible for the entire runway length. However, if the runway has a full length parallel taxiway, the runway profile may be such that an unobstructed line of sight will exist from any point five feet (1.5 m) above the runway centre line for one-half the runway length. Regarding the Note, the 1.5 m as compared to 3 m height difference is additionally required for the runway visibility zone contained in the *Aerodrome Design Manual* (Doc 9157), Part 1, *Runways*.
- 3.1.18* Minimum and maximum transverse runway slopes are based on aircraft approach categories as follows:
- For Categories A and B: 1.0-2.0 per cent
 For Categories C and D: 1.0-1.5 per cent

*Recommended Practice

- 3.2.3* The United States does not require that the minimum combined runway and shoulder widths equal 60 m. The widths of shoulders are determined independently.
- 3.2.4* The transverse slope on the innermost portion of the shoulders can be as high as 5 per cent.
- 3.3.3 A strip width of 120 m is used for code 3 and 4 runways for precision, non-precision and non-instrumented operations. For code 1 and 2 precision runways, the width is 120 m. For non-precision/visual runways, widths vary from 37.5 m up to 120 m.
- 3.3.4*
- 3.3.5*
- 3.3.7 The frangibility and object removal requirement are applicable only to the FAA runway safety area (RSA) and the obstacle free zone (OFZ). The RSA functions similarly to the ICAO “graded portion” of the runway strip. The difference is less than 1.3 m; that is, the FAA Standard measure 76.2 m as compared to 77.5 m under Annex 14. However, the area beyond the RSA, the runway object free area, measures 120 m and requires object removal, but not frangibility for permitted objects.
- 3.3.9* Airports used exclusively by small aircraft (U.S. Airplane Design Group I) may be graded to distances as little as 18 m from the runway centre line.
- 3.3.14* The maximum transverse slope of the graded portion of the strip can be 3 per cent for Aircraft Approach Categories C and D and 5 per cent for Aircraft Approach Categories A and B.
- 3.3.15* The United States does not have standards for the maximum transverse grade on portions of the runway strip falling beyond the area that is normally graded.
- 3.3.17* Runways designed for use by smaller aircraft under non-instrument conditions may be graded to distances as little as 18 m from the runway centre line (U.S. Airplane Design Groups I and II).
- 3.4.2 For certain code 1 runways the runway end safety areas may be only 72 m.
- 3.6.4* Pavement friction measurements are taken for only the runway with full strength pavement and not for the surface of stopways.
- 3.7.1*
- 3.7.2* The United States does not provide Standards or Recommended Practices for radio altimeter operating areas.
- 3.8.3* The United States specifies a 6 m clearance for Design Group VI aeroplanes.
- 3.8.4* The taxiway width for Design Group VI aircraft is 30 m.
- 3.8.5* The United States also permits designing taxiway turns and intersections using the judgmental oversteering method.
- 3.8.7* Minimum separations between runway and taxiway centre lines are shown in Table 1. Minimum separations between taxiways and taxilanes and between taxiway/taxilanes and fixed/moveable objects are shown in Table 2. Generally, United States separations are larger for non-instrumented runways, and smaller for instrumented runways, than in the Annex. Values are also provided for aircraft with wingspans up to 80 m. For Code F, separations in all cases equal 180 m.
- 3.8.8* Longitudinal grades (slopes) for taxiways are based on approach category (code number) rather than wing span (code letter). However, values are: Code 1 and 2 = 3.0 per cent; Code 3 and 4 = 1.5 per cent.

*Recommended Practice

- 3.8.10* Line-of-sight standards for taxiways are not provided in United States practice, but there is a requirement that the sight distance along a runway, from an intersecting taxiway, must be sufficient to allow a taxiing aircraft to safely enter or cross the runway.
- 3.8.11* Transverse slopes of taxiways are based on aircraft approach categories. For Categories C and D slopes are 1.0-1.5 percent; for A and B 1.0-2.0 per cent.
- 3.9.1* The overall width of the taxiway plus shoulders is 54 m as compared to 60 m for the Annex.
- Remark:* For Code F aircraft the emphasis is on wider full strength pavement rather than shoulders. The United States requires 30 m taxiway widths as compared to the 25 m width under 3.8.4.
- 3.10.5* Grading of runway strips are downward and are based on aircraft approach categories, that is code numbers. Furthermore, we recommend a downward slope from the horizontal for the first three metres beyond the taxiway or shoulders followed by a downward range of 1.5-3.0 per cent for the remainder of the strip.
- 3.11.6
Table 3-2 c. Regarding Table 3-2, FAA runway centre line to taxi-holding position, etc., a separation for code 1 is 38 m for non-precision operations and 53 m for precision. Code 3 and 4 precision operations require a separation of 75 m, except for “wide bodies”, which require 85 m. There is no standard clearance for Code F aircraft at this time.
- 3.14.4* The ability to bypass de-icing facilities is a standard and not a recommendation.
- 3.14.9* Only Code D and E clearances are shorter; that is, 2 m and 0.5 m, respectively.
- 3.14.10* Only Codes A, B and D are shorter; that is, 2.75 m, 1.5 m and 1.0 m, respectively.

CHAPTER 4

- 4.1 Obstacle limitation surfaces similar to those described in 4.1-4.20 are found in Federal Aviation Regulation Part 77.
- 4.1.21 A balked landing surface is not used.
- 4.1.25 The United States does not establish take-off climb obstacle limitation areas and surfaces *per se* but does specify protective surfaces for each end of the runway based on the type of approach procedures available or planned. The dimensions and slopes for these surfaces and areas are listed in Table 3.
- 4.2
Table 4-1 For Code C, D and F aircraft, the width of the OFZ inner approach equals 120 m.
- Remark:* Research and development for the width measurement for Code F are ongoing. Flight Standards will issue, upon completion of the R & D simulation, an FAA document with results and possible new recommendations.

CHAPTER 5

- 5.2.1.8* The United States does not require unpaved taxiways to be marked.
- 5.2.2.2* The United States does not require a runway designator marking for unpaved runways.

* Recommended Practice

- 5.2.2.4 Zeros are not used to precede single digit runway markings. An optional configuration of the numeral 1 is available to designate a Runway 1 and to prevent confusion with the runway centre line.
- 5.2.4.2*
5.2.4.3* Threshold markings are not required, but sometimes provided, for non-instrument runways that do not serve international operations.
- 5.2.4.5 The current United States standard for threshold designation is eight stripes, except that more than eight stripes may be used on runways wider than 45 m. After 1 January 2008, the United States standard will comply with Annex 14.
- 5.2.4.6 The width and spacing of threshold stripes will comply with Annex 14 after 1 January 2008.
- 5.2.4.10 When a threshold is temporarily displaced, there is no requirement that runway or taxiway edge markings, prior to the displaced threshold, be obscured. These markings are removed only if the area is unsuitable for the movement of aircraft.
- 5.2.5.2
5.2.5.3* Aiming point markings are required on precision instrument runways and code 3 and 4 runways used by jet aircraft.
- 5.2.5.4 The aiming point marking commences 306 m from the threshold at all runways.
- 5.2.6.3 The United States pattern for touchdown zone markings, when installed on both runway ends, is only applicable to runways longer than 4 990 feet. On shorter runways, the three pairs of markings closest to the runway midpoint are eliminated.
- 5.2.6.4 The United States standard places the aiming point marking 306 m from the threshold where it replaces one of the pairs of three-stripe threshold markings. The 306 m location is used regardless of runway length.
- 5.2.6.5* Touchdown zone markings are not required at a non-precision approach runway, though they may be provided.
- 5.2.7.4* Runway side stripe markings on a non-instrument runway may have an overall width of 0.3 m.
- 5.2.8.3 Taxiway centre line markings are never installed longitudinally on a runway even if the runway is part of a standard taxi-route.
- 5.2.9.6* The term “ILS” is used instead of CAT I, CAT II, CAT III.
- 5.2.9.7 Runway-holding position markings at runway/runway intersections are as shown in Figure 5-6, Pattern A.
- 5.2.11.4
5.2.11.5*
5.2.11.6* Check-point markings are provided, but the circle is 3 m in diameter and the directional line may be of varying width and length. The color is the yellow used for taxiway markings.
- 5.2.12 Standards for aircraft stand markings are not provided.
- 5.2.13.1* Apron safety lines are not required although many aerodromes have installed them. The United States does not set marking standards for aprons, finding it more effective to let airports and airlines manage activities related to aircraft parking.

*Recommended Practice

- 5.2.14.1 The United States does not have standards for holding position markings on roadways that cross runways. Local traffic control practices are used.
- 5.3.1.1 The United States does not have regulations to prevent the establishment of non-aviation ground lights
5.3.1.2* that might interfere with airport operations.
- 5.3.1.3 New approach lighting installations will meet the frangibility requirements. Some existing non-frangible
5.3.1.4 systems may not be replaced before 1 January 2005.
- 5.3.2.1* There is no requirement for an airport to have emergency runway lighting available if it does not have
5.3.2.2* a secondary power source. Some airports do have these systems, and there is an FAA specification for
5.3.2.3* these lights.
- 5.3.3.1 Only airports served by aircraft having more than 30 seats are required to have a beacon, though they
5.3.3.3 are available at many others.
- 5.3.3.6 Although the present United States standard for beacons calls for 24-30 flashes per minute, some older beacons may have flash rates as low as 12 flashes per minute.
- 5.3.3.8 Coded identification beacons are not required and are not commonly installed. Typically, airport beacons conforming to 5.3.3.6 are installed at locations served by aircraft having more than 30 seats.
- 5.3.4.1 While the United States has installed an approach light system conforming to the specifications in 5.3.4.10 to 5.3.4.19, it also provides for a lower cost system consisting of medium intensity approach lighting and sequenced flashing lights (MALSF) at some locations.
- 5.3.4.2 In addition to the system described in 5.3.4.1, a system consisting of omnidirectional strobe lights (ODALS) located at 90 m intervals extending out to 450 m from the runway threshold is used at some locations.
- 5.3.4.10 to 5.3.4.19 The United States standard for a precision approach Category I lighting system is medium intensity approach lighting system with runway alignment indicator lights (MALSR). This system consists of 3 m barrettes at 60 m intervals out to 420 m from the threshold and sequenced flashing lights at 60 m intervals from 480 m to 900 m. A crossbar 20 m in length is provided 300 m from the threshold. The total length of this system is dependent upon the ILS glide slope path angle. For angles 2.75° and higher, the length is 720 m.
- 5.3.4.18 The capacitor discharge lights can be switched on or off when the steady-burning lights of the approach lighting system are operating. However, they cannot be operated when the other lights are not in operation.
- 5.3.4.22 The United States standard for a precision approach Category II and III lighting system has a total length dependent upon the ILS glide path angle. For angles 2.75° and higher, the length is 720 m.
- 5.3.4.35 The capacitor discharge lights can be switched on or off when the steady-burning lights of the approach lighting system are operating. However, they cannot be operated when the other lights are not in operation.
- 5.3.5.1 Visual approach slope indicator systems are not required for all runways used by turbojets except runways involved with land and hold short operations that do not have an electronic glideslope system.

*Recommended Practice

- 5.3.5.2 In addition to PAPI and APAPI systems, VASI and AVASI type systems remain in service at United States airports with commercial service. Smaller general aviation airports may have various other approach slope indicators including tri-color and pulsating visual approach slope indicators.
- 5.3.5.3 Visual approach slope indicator systems are not required for all runways used by turbojets except
5.3.5.4 runways involved with land and hold short operations that do not have an electronic glideslope system.
- 5.3.5.27 The United States standard for PAPI allows for the distance between the edge of the runway and the first light unit to be reduced to 9 m for code 1 runways used by non-jet aircraft.
- 5.3.5.42 The PAPI obstacle protection surface used is as follows: The surface begins 90 m in front of the PAPI system (toward to the threshold) and proceeds outward into the approach zone at an angle 1° less than the aiming angle of the third light unit from the runway. The surface flares 10° on either side of the extended runway centre line and extends four statute miles from its point of origin.
- 5.3.8.4 The United States permits the use of omnidirectional runway threshold identification lights.
- 5.3.13.2 The United States does not require the lateral spacing of touchdown zone lights to be equal to that of touchdown zone marking when runways are less than 45 m wide.
- 5.3.14 The United States has no provision for stopway lights.
- 5.3.15.1 Taxiway centre line lights are required only below 183 m runway visual range (RVR) on designated taxi
5.3.15.2* routes. However, they are generally recommended whenever a taxiing problem exists.
- 5.3.15.4 Taxiway centre line lights are not provided on runways forming part of a standard taxi route even for low visibility operations. Under these conditions, the taxi path is coincident with the runway centre line and the runway lights are illuminated.
- 5.3.15.7 *Comment on Implementation:* The United States standard for taxiway centre line lights on exit taxiways was brought into compliance with this Annex 14 provision on 1 September 1998. However, United States airports are still in the process of implementing the Standard.
- 5.3.15.10* The United States permits an offset of up to 60 cm.
- 5.3.16.2 Taxiway edge lights are not provided on runways forming part of a standard taxi route.
- 5.3.17.1 Stop bars are required only for RVR conditions less than a value of 183 m at taxiway/runway
5.3.17.2* intersections where the taxiway is lighted during low visibility operations. Once installed, controlled
5.3.17.3 stop bars are operated at RVR conditions less than a value of 350 m.
5.3.17.4*
5.3.17.5*
- 5.3.17.6 Elevated stop bar lights are normally installed longitudinally in line with taxiway edge lights. Where edge lights are not installed, the stop bar lights are installed not more than 3 m from the taxiway edge.
- 5.3.17.9 The beamspread of elevated stop bar lights differs from the in-pavement lights. The inner isocandela curve for the elevated lights is ± 7 hor. and ± 4 vert.
- 5.3.17.10 The United States standard for stop bars, which are switchable in groups, does not require the taxiway centre line lights beyond the stop bars to be extinguished when the stop bars are illuminated. The taxiway centre line lights which extend beyond selectively switchable stop bars are grouped into two

*Recommended Practice

segments of approximately 45 m each. A sensor at the end of the first segment re-illuminates the stop bar and extinguishes the first segment of centre line lights. A sensor at the end of the second segment extinguishes that segment of centre line lights.

5.3.18.1 Taxiway intersection lights are also used at other hold locations on taxiways such as low visibility holding points.

5.3.18.2* Taxiway intersection lights are collocated with the taxiway intersection marking. The marking is located at the following distances from the centre line of the intersecting taxiway:

Aeroplane Design Group	Distance (m)
I	13.5
II	20
III	28.5
IV	39
V	48.5
VI	59

5.3.20.1 Runway guard lights are required only for RVR conditions less than a value of 350 m.

5.3.20.2*

5.3.20.4 Runway guard lights are placed at the same distance from the runway centre line as the aircraft holding distance, or within a few feet of this location.

5.3.20.5

5.3.20.17 The new United States standard for in-pavement runway guard lights complies with Annex 14. However, there may be some existing systems that do not flash.

5.3.21 The United States does not set aviation standards for floodlighting aprons.

5.3.22 The United States does not provide standards for visual docking guidance systems.

5.3.24.1 The United States does not have a requirement for providing road-holding position lights during RVR conditions less than a value of 350 m.

5.4.1.3 Signs are often installed a few centimetres taller than specified in Annex 14, Volume 1, Table 5-4.

5.4.1.6 Sign inscriptions are slightly larger, and margins around the sign slightly smaller, than indicated in Annex 14, Volume 1, Appendix 4.

5.4.1.7 The sign luminance requirements are not as high as specified in Appendix 4. The United States does not specify a night-time color requirement in terms of chromaticity.

5.4.2.2 All signs used to denote precision approach holding positions have the legend “ILS”.

5.4.2.4

5.4.2.7 United States practice uses the NO ENTRY sign to prohibit entry by aircraft only.

5.4.2.9 The second mandatory instruction sign is usually not installed unless added guidance is necessary.

5.4.2.10 All signs used to denote precision approach holding positions have the legend “ILS”.

*Recommended Practice

- 5.4.2.11 The second mandatory instruction sign is usually not installed unless added guidance is necessary.
- 5.4.2.14 All signs used to denote precision approach holding positions have the legend “ILS”.
- 5.4.2.15 Signs for holding aircraft and vehicles from entering areas where they would infringe on obstacle limitation surfaces or interfere with navaids are inscribed with the *designator of the approach*, followed by the letters “APCH”. For example: “15-APCH”.
- 5.4.2.18 All signs used to denote precision approach holding positions have the legend “ILS”.
- 5.4.3.15 United States practice is to install signs about 3 to 5 m closer to the taxiway/runway (See Annex 14, Table 5-4).
- 5.4.3.17 The United States does not have standards for the location of runway exit signs.
- 5.4.3.27 A yellow border is used on all location signs, regardless of whether they are stand-alone or collocated with other signs.
- 5.4.3.29 United States practice is to use Pattern A on runway vacated signs, except that Pattern B is used to indicate that an ILS critical area has been cleared.
- 5.4.3.34* The United States does not have standards for signs used to indicate a series of taxi-holding positions on the same taxiway.
- 5.4.4.4* The inscription “VOR Check Course” is placed on the sign in addition to the VOR and DME data.
- 5.4.5.1* The United States does not have requirements for aerodrome identification signs, though they are usually installed.
- 5.4.6.1* Standards are not provided for signs used to identify aircraft stands.
- 5.4.7.2 The distance from the edge of road to the road-holding position sign conforms to local highway practice.
- 5.5.2.2* Boundary markers may be used to denote the edges of an unpaved runway.
- 5.5.3 There is no provision for stopway edge markers.
- 5.5.7.1* Boundary markers may be used to denote the edges of an unpaved runway.

CHAPTER 6

- 6.1 The FAA does not exercise regulatory authority over the marking and lighting of obstacles. However, it reviews proposed construction of tall objects in the vicinity of airports and recommends the minimum marking and lighting consistent with aviation safety.
- 6.2.3* The maximum dimension of the rectangles in a chequered pattern is 6 m on a side.
- 6.3.21* The effective intensity, for daylight-luminance background, of Type A high-intensity obstacle lights is 270 000 cd \pm 25 per cent. The effective intensity, for daylight-luminance background, of Type B high-intensity obstacle lights is 140 000 cd \pm 25 per cent. A higher intensity improves conspicuity.
- 6.3.22

*Recommended Practice

Table 6-3	United States standards do not require 75 per cent maximum intensity at -1° , as shown in Column 9 for medium- and high-intensity obstacle lights.
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CHAPTER 7

7.1.2*	Closed markings are not used with partially closed runways. See 5.2.4.10 above.
7.1.4	Closed markings with shapes similar to Figure 7.1b are used to indicate closed runways and taxiways. The “X” for denoting a closed runway is yellow.
7.1.5	In the United States, when a runway is permanently closed, only the threshold marking, runway designation marking, and touchdown zone marking need be obliterated. Permanently closed taxiways need not have the markings obliterated.
7.1.7	The United States does not require unserviceability lights across the entrance to a closed runway or taxiway when it is intersected by a night-use runway or taxiway.
7.4.4	Flashing yellow lights are used as unserviceability lights. The intensity is such as to be adequate to delineate a hazardous area.

CHAPTER 8

8.1.5*	A secondary power supply for non-precision instrument and non-instrument approach runways is not required, nor is it required for all precision approach runways.
8.1.6*	
8.1.7*	
8.1.8	
8.2.1	<i>Remark:</i> There is no requirement in the United States to interleave lights as described in the <i>Aerodrome Design Manual</i> , Part 5.
8.2.3	See 5.3.15.4 and 5.3.16.2.
8.7.2	Glide slope facilities and certain other installations located within the runway strip, or which penetrate obstacle limitation surfaces, may not be frangibly mounted.
8.7.3	
8.7.4*	
8.9.7*	A Surface Movement Surveillance System is recommended from 350 m RVR down to 183 m. Below 183 m RVR, a surface movement radar or alternative technology is generally required.

CHAPTER 9

9.1.1	Emergency plans such as those specified in this section are required only at airports serving scheduled air carriers using aircraft having more than 30 seats. These airports are certificated under Part 139 of the United States Federal Aviation Regulations. In practice, other airports also prepare emergency plans.
9.1.12	Full-scale aerodrome emergency exercises are conducted at intervals, not to exceed three years, at airports with scheduled passenger service using aircraft with more than 30 seats. <i>Remark:</i> Three years has been found to be an interval that provides for an efficient allocation of airport resources.

*Recommended Practice

- 9.2.1 Rescue and fire fighting equipment and services such as those specified in this section are required only at airports serving scheduled air carriers with aircraft having more than 30 seats. Such airports generally equate to ICAO categories 4 through 9.
- 9.2.3* There is no plan to eliminate, after 1 January 2005, the current practice of permitting a reduction of one category in the Index when the largest aircraft has fewer than an average of five scheduled departures a day. The reduction in category is a rudimentary cost/benefit consideration and also facilitates the introduction of large aircraft into scheduled service by not making the air carrier's planning contingent on the airport's immediate acquisition of additional equipment.
- 9.2.4 The level of protection at United States airports is derived from the length of the largest aircraft serving the airport. This is similar to the Annex 14 procedure, except that maximum fuselage width is not used.
- 9.2.5
- Remark:* United States indices A-E are close equivalents of the Annex's categories 5-9. The United States does not have an equivalent to Category 10. The United States will consider the requirements of Category 10 when it adopts a new index for very large aircraft. Further harmonization with the Annex will be considered in the future.
- 9.2.10 The required fire fighting equipment and agents by index are shown in Table 4.
- The substitution equivalencies between complementary agents and foam meeting performance level A are also used for protein and fluoroprotein foam. Equivalencies for foam meeting performance level B are used only for aqueous film forming foams.
- 9.2.18* At least one apparatus must arrive and apply foam within 3 minutes, with all other required vehicles arriving within 4 minutes. Response time is measured from the alarm at the equipment's customary assigned post, to the commencement of the application of foam at the mid-point of the farthest runway.
- 9.2.19*
- Remark:* The United States values a rapid response and the presence of professional fire fighters at the earliest possible time to deal with incipient conditions.
- 9.2.29* For ICAO Category 6 (U.S. index B) the United States allows one vehicle.
- 9.4.5 At the present time, there is no requirement to perform tests using a continuous friction measuring device with self-wetting features. Some United States airports own these devices, while others use less formal methods to monitor build-up of rubber deposits and the deterioration of friction characteristics.
- Remark:* The United States is working toward making these devices a requirement, at least at larger airports.
- 9.4.16 The standard grade for temporary ramps is 15 feet longitudinal per 1 inch of height (0.56 per cent slope) maximum, regardless of overlay depth.
- 9.4.20 There is no United States standard for declaring a light unserviceable if its intensity is less than 50 per cent of the specified or design value of the main beam average intensity.

*Recommended Practice

Table 1. Minimum separations between runway centre line and parallel taxiway/taxilane centre line

Operation	Aircraft approach category	Aeroplane design group						
		I ¹	I	II	III	IV	V	VI
Visual runways and runways with not lower than $\frac{3}{4}$ -statute mile (1 200 m) approach visibility minimums	A&B	150 ft 45 m	225 ft 67.5 m	240 ft 72 m	300 ft 90 m	400 ft 120 m	–	–
Runways with lower than $\frac{3}{4}$ -statute mile (1 200 m) approach visibility minimums	A&B	200 ft 60 m	250 ft 75 m	300 ft 90 m	350 ft 105 m	400 ft 120 m	–	–
Visual runways and runways with not lower than $\frac{3}{4}$ -statute mile (1 200 m) approach visibility minimums	C&D	–	300 ft 90 m	300 ft 90 m	400 ft 120 m	400 ft 120 m	400 ² ft 120 ² m	600 ft 180 m
Runways with lower than $\frac{3}{4}$ -statute mile (1 200 m) approach visibility minimums	C&D	–	400 ft 120 m	400 ft 120 m	400 ft 120 m	400 ft 120 m	400 ² ft 120 ² m	600 ft 180 m

¹ Pertains to small (less than 5 700 kg) aeroplanes.

² Corrections are made for altitude: 120 m separation for airports at or below 410 m; 135 m for altitudes between 410 m and 2 000 m; and 150 m for altitudes above 2 000 m.

Table 2. Minimum taxiway and taxilane separations

	Aeroplane design group					
	I	II	III	IV	V	VI
Taxiway centre line to: Parallel taxiway/ taxilane centre line	69 ft 21 m	105 ft 32 m	152 ft 46.5 m	215 ft 65.5 m	267 ft 81 m	324 ft 99 m
Fixed or movable object	44.5 ft 13.5 m	65.5 ft 20 m	93 ft 28.5 m	129.5 ft 39.5 m	160 ft 48 m	193 ft 59 m
Taxiway centre line to: Parallel taxilane centre line	64 ft 19.5 m	97 ft 29.5 m	140 ft 42.5 m	198 ft 60 m	245 ft 74.5 m	298 ft 91 m
Fixed or movable object	39.5 ft 12 m	57.5 ft 17.5 m	81 ft 24.5 m	112.5 ft 24.5 m	138 ft 42 m	167 ft 51 m

Table 3. Dimensions and slopes for protective areas and surfaces

Type of approach procedure	Precision approach	Non-precision instrument approach			Visual runway	
	All runways	All runways ^a	Runways other than utility ^b	Utility runways ^d	Runways other than utility	Utility runways
Width of inner edge	305 m	305 m	152 m	152 m	152 m	76 m ^c
Divergency (each side)	15 per cent	15 per cent	15 per cent	15 per cent	10 per cent	10 per cent
Final width	4 877 m	1 219 m	1 067 m ^c	610 m	475 m ^c	381 m ^c
Length	15 240 m	3 048 m ^c	3 048 m ^c	1 524 m ^c	1 524 m ^c	1 524 m ^c
Slope: inner 3 049 m	2 per cent	2.94 per cent ^c	2.94 per cent ^c	5 per cent ^c	5 per cent ^c	5 per cent ^c
Slope: beyond 3 048m	2.5 per cent ^c					

^a With visibility minimum as low as 1.2 km.

^b With visibility minimum greater than 1.2 km.

^c Criteria less demanding than Table 4-1 dimensions and slopes.

^d Utility runways are intended to serve propeller driven aircraft having a maximum take-off mass of 5 670 kg.

Table 4. Fire extinguishing agents and equipment

Index	Aircraft length		Total minimum quantities of extinguishing agents			
	More than	Not more than	Dry chemical	Water for protein foam	Minimum number of trucks	Discharge rate ¹
A		27 m	225 kg	0	1	See below
B	27 m	38 m	225 kg	5 700 L	1	See below
C	38 m	48 m	225 kg	5 700 L	2	See below
D	48 m	60 m	225 kg	5 700 L	3	See below
E	60 m		225 kg	11 400 L	3	See below

¹ Truck size

1 900 L but less than 7 600 L:

7 600 L or greater:

Discharge rate (Litres per minute):

at least 1 900 but not more than 3 800.

at least 2 280 but not more than 4 560.